National Institute of Environmental Health Sciences

Heat wave impacts on mortality in Shanghai, 1998 and 2003

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Abstract:

A variety of research has linked extreme heat to heightened levels of daily mortality and, not surprisingly, heat waves both in 1998 and in 2003 all led to elevated mortality in Shanghai, China. While the heat waves in the two years were similar in meteorological character, elevated mortality was much more pronounced during the 1998 event, but it remains unclear why the human response was so varied. In order to explain the differences in human mortality between the two years' heat waves, and to better understand how heat impacts human health, we examine a wide range of meteorological, pollution, and social variables in Shanghai during the summers (15 June to 15 September) of 1998 and 2003. Thus, the goal of this study is to determine what was responsible for the varying human health response during the two heat events. A multivariate analysis is used to investigate the relationships between mortality and heat wave intensity, duration, and timing within the summer season, along with levels of air pollution. It was found that for heat waves in both summers, mortality was strongly associated with the duration of the heat wave. In addition, while slightly higher than average, the air pollution levels for the two heat waves were similar and cannot fully explain the observed differences in human mortality. Finally, since the meteorological conditions and pollution levels for the two heat waves were alike, we conclude that improvements in living conditions in Shanghai, such as increased use of air conditioning, larger living areas, and increased urban green space, along with higher levels of heat awareness and the implementation of a heat warning system, were responsible for the lower levels of human mortality in 2003 compared to 1998.

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Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature: ☑

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact:

specification of health effect or disease related to climate change exposure

Injury

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Elderly, Low Socioeconomic Status

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content